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26 March 1984

China Report

SCIENCE AND TECHNOLOGY

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CHINA REPORT
SCIENCE AND TECHNOLOGY

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CHINA INSTRUMENT SOCIETY CALLS WORK CONFERENCE

Beijing YIQI YU WEILAI [INSTRUMENTATION AND FUTURE] in Chinese No 8, 1983 p 32

[Article: "China Instrumentation Society Calls Work Conference"]

[Text] The China Instrumentation Society called a work conference in Kunming 15-20 July attended by 46 academic society cadres from 37 local societies and specialist societies nationwide. The conference was chaired by Lu Tingjie [7120 1694 2638], deputy secretary of the society. The conference surveyed and exchanged experience and situations in launching activity to carry out planning in each society since the beginning of the year, discussed and set up work plans for the near term, and deliberated on and approved local and specialist societies which are to be newly established this year.

The conference was very lively, both exchanging experience and researching work, as well as being a short course for academic society cadres on how to do society work. The conference made a specialized study of the experience of the "Biomedical Analytical Instrumentation Technology Exchange and Exhibit" jointly held by the Wuhan Instrument Society and the Analytical Instrument Society. Everyone felt that joint activity of local societies and specialized societies is beneficial for strengthening lateral and vertical contacts, giving full play to the strengths of local and specialized societies, and unified and organized the greater participation of scientific and technical [S&T] personnel. In future this direction should be further developed. During the conference, many local societies and specialist societies made contacts on their own initiative and prepared for future joint activities.

The conference decided that in the immediate future academic societies should strive to do the following work:

1. strengthen preparations for the "China Instrumentation Society Exhibition and Training Center";

2. establish the Heilongjiang, Jilin, Zhejiang, Gansu, and Fujian level societies and information research and managerial science societies;

3. within the year create the China Instrument Society Member Report;

4. actively arrange for larger scale activity of the "Instrument Reliability Technology Exchange Meeting," "All-China Transducer Technology Conference and Exhibition," and the "Energy-Saving Applied Technology Exchange Meeting";

5. conscientiously organize S&T personnel to start research work on "China 2000."

8226
CSO: 4008/49

IMPROVED 'Y-11' GENERAL-PURPOSE TRANSPORT DESIGNATED 'Y-12'

Beijing GUOJI HANGKONG [INTERNATIONAL AVIATION] in Chinese No 12, 5 Dec 83 pp 2-4

[Article by Xiong Wenjie [3574 2429 2638]: "The 'Y-12' Twin-Engine Turboprop Light Transport"]

[Text] The specialty aircraft used by governments around the world are mostly light-weight, general-purpose aircraft. In other words, only one aircraft is developed which is capable of satisfying the basic performance requirements of many roles such as short-range transport, agriculture, forestry, and geological survey. However, it can also satisfy the special requirement of single role operation after the necessary modifications are made to the aircraft. While the performance of such an aircraft may not be optimized for specific missions, since it has been designed to meet the needs of various applications, it is clearly superior in terms of operational versatility and economy.

Over the years, the Chinese-made "Y-11" piston type twin-engine general-purpose aircraft has been converted into liquid spray and powder spray agricultural models and geological survey models; it has accumulated 4,500 flight hours, and had been tested under conditions of both high temperatures and extreme cold. It has flown all over China on such missions as spraying fertilizer and pest control over farmland and forest; the geological survey model has successfully performed magnetic and electrical measurements.

But as the national economy continued to grow, the "Y-11" began to show its limitations, with the primary deficiencies reflected in payload and passenger capacity, engine power, and range. After extensive market research and analysis, we have made certain improvements to the "Y-11" so its performance can meet a wider range of additional requirements. This improved model is the "Y-12" general-purpose aircraft.

Design Features

The development plan of the "Y-12" was finalized in 1979, actual design began in 1980, and manufacturing and assembly of three prototypes began in 1981. The first successful flight of the "Y-12" took place in 1982. At the present time, two of the aircraft are being used in full-scale flight tests, and small-scale production has begun.

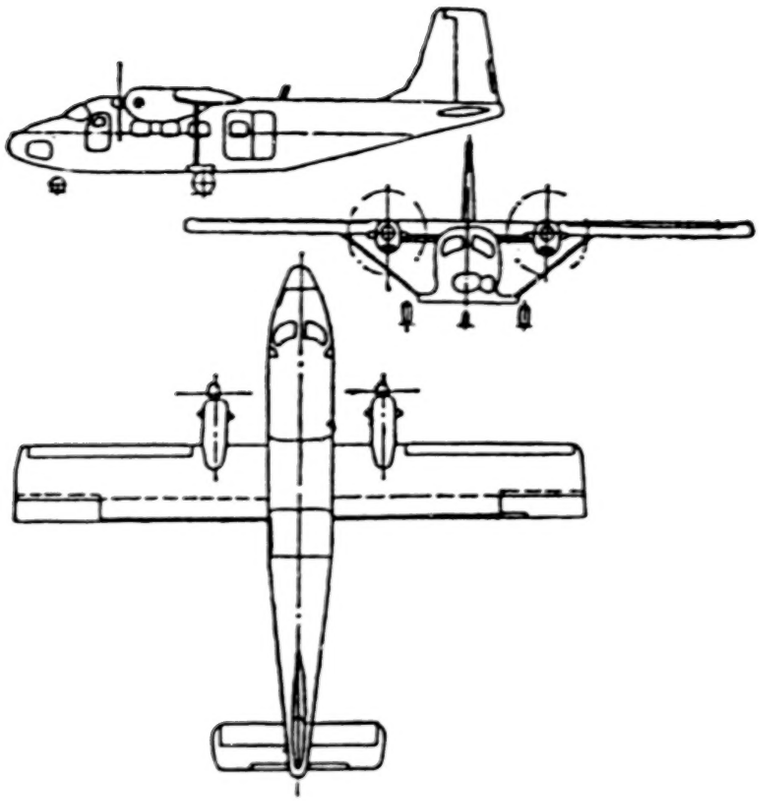


Fig 1. Three-sided view of the "Y-12."

The design principle of the "Y-12" is based on the needs of light-weight aircraft for the 1980's. The primary mission is to provide transportation for passengers and cargo on feeder routes, with secondary missions in geological survey, forest patrol and seeding, agricultural spraying, air drop and parachuting. Internationally accepted aviation regulations have been used as design standards to ensure flight safety. The products and parts which are not available domestically would be imported from abroad initially to ensure that the advanced performance standards of the aircraft are achieved.

The total aircraft weight is 5,000 kg; the main considerations in weight selection are:

1. The light-weight aircraft used for feeder route transportation mostly commutes between small towns or remote regions; it must be able to take off and land on rather crude runways of moderate length.

2. The aircraft has a payload of 1,200 kg and a range of more than 800 km. Such design specifications can satisfy the requirements of most applications. For shorter range transportation the payload can be increased; for longer range operations, it can meet the requirements of a 1,000 kg payload and a range of over 1,000 km.

3. The commonly used international aviation standards such as the U.S. FAR pt 23 and the British BCAR pt K specify that the weight limit of light-weight aircraft is 5,700 kg. In the case of the "Y-12," 5,000 kg has been chosen as the gross weight in order to provide sufficient single-engine climb rate under high temperature and high elevation conditions.

Wing Design

When the "Y-11" design was being finalized in 1977, the question of using the high-lift, low-drag GA-0417 airfoil to replace the NACA-4412 airfoil was addressed. The unique features of this new airfoil are as follows:

1. Its upper surface has a large leading edge radius, thus reducing the suction peak around the forward part of the wing, and delaying the occurrence of flow separation and loss of speed.

2. The upper surface is relatively flat, which results in a uniform load distribution along the chord; this also postpones flow separation and provides a relatively wide region of low drag performance at low speeds.

3. The rear section of the airfoil has a large chamber, which produces increased rear loading to compensate for the loss of lift near the leading edge.

4. The airfoil has a blunt trailing edge, with approximately the same slope on the upper and lower surfaces, thus producing a gradual pressure recovery over the upper surface and postponing flow separation and loss of speed.

The "Y-11" model has been used for wind tunnel tests on the GA-0417 and the NACA 4412 airfoils. Analysis of the results showed that the lift slope and the maximum lift coefficient of the new airfoil were both higher. In particular, it was noted that when the lift coefficient was in the range 0.7-1.2, the lift to drag ratio increased substantially; this proves that the new airfoil has a very wide region of low drag performance. Subsequently, this conclusion was also verified by flight test results of the "Y-11" equipped with GA-0417 wing designs. In terms of flight quality, except for the rather large negative pitching moment due to increased rear loading, all other aspects are quite good.

The major improvements achieved in the performance of the "Y-12" by using the GA-0417 airfoil instead of the NACA 4412 airfoil are: increased climb rate, increased single-engine flight ceiling, and increased range and endurance.

In addition, the new airfoil has a thickness/chord ratio of 17 percent, which allows a substantial increase in the capacity of the fuel tank, and therefore an increase in the maximum range.

Speed Determination

The speed range of the "Y-12" is specified to be 180-300 km/hr for the following reasons:

1. Aerial missions such as geological survey and agricultural and forestry operations require that the speed be no greater than 180 km/hr. On the other hand, passenger and cargo transport require higher cruising speeds. For special missions such as very low altitude spraying or aerial survey over difficult terrain, the speed can be reduced by lowering the total aircraft weight or by flying with small flap angles.

2. During air drop and parachuting, particularly during parachute training missions, it is desirable to operate the aircraft at three different speeds: low speed (180 km/hr), medium speed (240 km/hr), and high speed (300 km/hr).

3. It is desirable to reduce the take-off and landing speeds so that the aircraft can take off and land on relatively short unimproved runways.

Cabin Design

The "Y-12" has a rather spacious cabin. It is 1.7 m high and 1.6 m wide. The two sides of the cabin bulge slightly outward in the form of a drum, causing the cover skin to curve outward. The curved skin has much greater rigidity than the straight skin over a rectangular cabin; as a result, buffeting fatigue of the cover skin may be avoided.

The cargo door is located in the left rear section of the cabin, and is 1.45 m wide and 1.38 m high. There are two cabin doors located in the forward section and the rear section of the cabin. On passenger flights only the rear door is opened; on cargo flights both doors are opened in order to facilitate the loading and unloading of bulky cargoes. On agricultural and forestry spray missions, it can accommodate large containers of insecticides; particularly for seeding operations, the low specific gravity of tree and grass seed requires the use of large containers to improve the economy of the operation.

Between the 2d and 3d frames in the forward part of the fuselage and between the 20th and 22d frames of the rear section are two luggage compartments which are 0.77 m^3 and 1.89 m^3 in size respectively. They can store carry-on baggage or light cargo; they can also store onboard equipment and tools such as wheel blocks and thatch cloth to provide out-field maintenance capability. In addition, the forward and rear baggage compartments can also be used to adjust the center of gravity of the aircraft.

The "Y-12" is a general-purpose transport. Its cabin design and decoration must take into consideration the requirements of the particular application. The passenger model should be spacious, comfortable, and light weight, and should use fire-proof materials; the facilities inside the cabin should be designed for easy installation, removal and modification. The passenger cabin has five rows of single seats on the left side and six rows of double seats on the right; there are a total of 17 seats, and the distance between rows is 24 cm. Near the 20th frame of the passenger door is a seat for onboard service personnel. A simple lavatory can be installed in the rear luggage compartment between the 20th and 22nd frame.

The "Y-12" can also be converted into a 12-seat charter plane, and the passenger cabin can be rearranged to accommodate special requirements. There are three longitudinal guiderails on the floor and one guiderail on each wall for positioning the seats, which can be adjusted forward and backward.

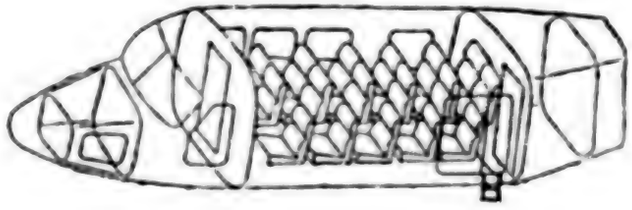


Fig 2. Layout of passenger cabin of the "Y-12."

Power Plant

The power plant used on the "Y-12" aircraft consists of two PT6A-27 engines built by Pratt and Whitney Aircraft of Canada. The selection was made primarily on the basis of the applications of the aircraft and engine performance.

A short-range transport generally operates at altitudes of 1,000 m-3,000 m and speeds of approximately 300 km/hr. For this application propeller engines are more economical than jet engines. The key question is whether to use piston engines or turboprop engines.

Piston engines have lower fuel consumption than turboprop engines, but turboprop engines are lighter (10.6 percent of the empty weight of the airplane), have a smaller cross-sectional area (0.233 m^2) and longer overhaul cycle (3,500 hours), a generate less vibration and noise. On balance, the PT6A-27 engine was selected.

Technical Data of the PT6A-27 Engine

power	equivalent horsepower	axle horsepower	fuel horsepower	ambient temperature
take-off	715	680	0.602	22 C
maximum continuous	715	680	0.602	22 C
maximum climb	652	620	0.612	22 C

Onboard Equipment

For a general-purpose light-weight aircraft such as the "Y-12," there is a great deal of flexibility in selecting the electronic equipment for communications and navigation. The selected communications equipment depends on the particular application. If the mission is limited to a fixed region, e.g., forest fire prevention, seeding, and spraying insecticides, it would be adequate to have onboard a command station, a radio compass and a radio altimeter in addition to the flight instruments. If the aircraft is used for feeder route passenger transportation, particularly if it is operating near large cities with heavy air traffic such as Beijing and Guangzhou, then in addition to the command station and radio compass, it must also be equipped with a communications station, omni-directional navigation station, beacon receiver, as well as transponder and ranging devices.

To meet export requirements, it is also possible to install more advanced, imported electronic equipment on the "Y-12" such as omni-directional navigation station VOR, distance measuring device DME, transponder and beacon receiver. This equipment and the imported stations, and radio compasses have already been successfully tested on the "Y-11."

3012
CSO: 4008/103

OPTIMAL DESIGN EFFORTS IN SHANGHAI DESCRIBED

Shanghai YUNCHOUXUE ZAZHI [CHINESE JOURNAL OF OPERATIONS RESEARCH] in Chinese No 1, Oct 82 pp 54-58

[Article by Operations Research Group, China Mathematics Society: "Some Examples of Optimal Design in Shanghai"]

[Text] In recent years a good deal of work in optimal design has been done in Shanghai. It began in several universities and research institutes, and as a result of a period of expansion and dissemination it is now being widely pursued in all universities and in many research organizations, enterprises and plants. The main areas affected by optimal design in Shanghai are: machinery, structures, motive power, electrical machinery, radio, optics, textiles, chemical engineering, railways, shipbuilding and construction. The techniques of optimal design are also being applied with excellent results to the solution of problems in biomedical engineering. According to preliminary statistics, in recent years several hundred optimal design projects of various sizes have been undertaken in Shanghai.

Establishing an effective, solvable model based on the characteristics of the problem is a critical aspect of optimal design; this requires a comprehensive, insightful analysis of the real problems under consideration. In addition, selecting the proper optimization methods to deal with each specific problem also directly affects the results of optimal design efforts. Therefore, it is extremely important to master the applications and techniques of all optimization computations.

Below, we present some typical examples in different areas, involving different methods of solution, in the hope of promoting an exchange of experience.

1. Optimal Design of a Triple-Tube Ammonia Synthesis Tower

The chemical reaction in triple-tube ammonia synthesis is described by the following series of ordinary differential equations (initial and boundary value problems):

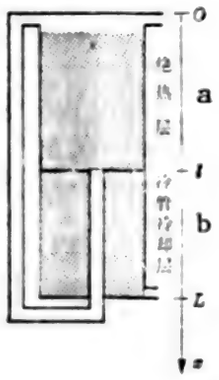
$$\begin{cases} \dfrac{dz}{dx} = c_1 (1+z)^2 \dfrac{I_0^{2.5}(1-b_2 z)^{8.5}(1-b_2 z - z)}{z(1-b_2 z)^{10}}, & (1\text{-}1) \\ \dfrac{dt_{cat}}{dx} = c_2 \dfrac{dz}{dx} / (1+z) - c_3; & (1\text{-}2) \end{cases}$$

(the above are for the insulating layer)

$$\begin{cases} \dfrac{dz}{dx} = \text{(same as right side of 1-1)} & (1\text{-}3) \\ \dfrac{dt_{cat}}{dx} = c_2 \dfrac{dz}{dx} / (1+z) - c_3 - c_4 (t_{cat} - t_{tub}), & (1\text{-}4) \\ \dfrac{dt_{tub}}{dx} = c_5 (t_{cat} - t_{tub}); & (1\text{-}5) \end{cases}$$

(the above are for the layer cooled by the cooling tube)

where z is the concentration of ammonia, t_{cat} is the temperature of the catalyst bed, t_{tub} is the temperature in the cooling tube, x is the height in the tower and the other symbols are explained in reference 1 (c_1 - c_5 are constants). The stationary-solution conditions are:



$$\begin{cases} z(0) = z_0, & (1\text{-}6) \\ t_{cat}(0) = t_{top}; & (1\text{-}7) \end{cases}$$

(the above are for $0 \leqslant x \leqslant l$)

$$\begin{cases} z(l) = z_l & \text{(these results are obtained} \quad (1\text{-}8) \\ t_{cat}(l) = t_{catl} & \text{from the insulating layer} \quad (1\text{-}9) \\ t_{tub}(L) = t_{topo} & \text{model)} \quad (1\text{-}10) \end{cases}$$

(the above are the boundary conditions for the cooled layer, i.e. for $l \leqslant x \leqslant L$)

Key:

a. Insulating layer
b. Lower cooled by cooling tube

Constant C_1 in equation (1-1) contains factor C_{orr}, which is a function of the number of days, d, that the catalyst has been in use and the bed height, x; this is the catalyst activity correction coefficient and must be determined on the basis of measurements. Production reports from operating ammonia plants give the initial data: the number of days' use of the catalyst, the temperature-sampling point heights and the catalyst bed temperatures. The formula chosen for C_{orr} is

$$C_{orr} = a_1 + a_2 \lg d + a_3 (\lg d)^2 + [a_4 + a_5 \lg d + a_6 (\lg d)^2] \sqrt{x} + [a_7 + a_8 \lg d + a_9 (\lg d)^2] x + [a_{10} + a_{11} \lg d + a_{12} (\lg d)^2] x^2.$$

The problem is reduced to estimating the least square values of coefficients a_1-a_{12}. The calculated values are those of t_{cat} derived from equations

(1-1) - (1-10) for the various sampling heights, while the actual values are the figures for t_{cat} from production reports.

The Rosenbrock method [2] is used to solve the equation

$$\min \Sigma [t_{cat} \text{ (calculated)} - t_{cat} \text{ (actual)}]^2.$$

The calculation results indicate that the relative temperature error is about 3 percent and the relative deviation in ammonia output is 10 percent or less [3]. This result provides a reliable numerical model and a computation method for optimizing ammonia synthesis tower design and process operation.

2. Optimal Design of a Short-Word Digital Filter

Digital filters of unlimited word length are difficult to implement, particularly on a microprocessor. When a computer is used to solve the general word-length recursive digital filter problem, digitization and truncation of the data raise the problem of minimizing amplitude-frequency characteristic error.

A digital filter can be described by means of the discrete transfer function

$$Y(z) = A \prod_{i=1}^{k} \frac{1 + a_i z^{-1} + b_i z^{-2}}{1 + c_i z^{-1} + d_i z^{-2}} \qquad (2\text{-}1)$$

where A is the gain factor; a_i, b_i, c_i and d_i are the second-order filter constants; and k is the number of filter stages. If we use Y_d to designate the ideal amplitude-frequency characteristic required, $e(\omega)$ to designate the the error function ($\omega = \pi\nu$, where ν is the normalized frequency. $\nu \in [0, 1]$), and $\delta(\omega)$ to represent the tolerance function, then by substituting $z = j^{j\omega}$ into equation (2-1) we obtain the amplitude-frequency charact ristic $Y(\omega)$, from which we obtain

$$e(\omega) = \frac{1}{\delta(\omega)} [A \cdot Y(\omega) - Y_d], \quad \omega \in [0, \pi]. \qquad (2\text{-}2)$$

Thus the problem is to select a_i, b_i, c_i and d_i in equation (2-2) so that for every ω such that $\omega \in [0, \pi]$, the maximum of the error function $e(\omega)$ is minimized, i.e.,

$$\min \max_{\omega \in [0, \pi]} e(\omega), \qquad (2\text{-}3)$$

This is a minimax problem for a nonlinear function.

Because we wish to design a short-word digital filter, we require that constants a_i, b_i, c_i and d_i have a finite number of binary digits (8, for example) and that the relative discretization accuracy of the coefficients 2^{-Q} (where Q is a positive integer); $2^Q a_i$, $2^Q b_i$, $2^Q c_i$ and $2^Q d_i$ all must be

integers. In addition, a stable system with minimum phase must meet the following constraints:

(1) the zeroes of equation (1-1) must lie within the unit circle;

(2) the poles of equation (1-1) must lie within the unit circle.

To meet these conditions, the coefficients of equation (2-1) must meet the following conditions (see reference 4 for proof):

(1) $c_i > 2$;

(2) $|d_i|<1$, $1+d_i-c_i>0$, $1+d_i+c_i>0$.

To solve equation (2-3) subject to conditions (1) and (2), we use the random-model search method (a combination of the Hooke-Jeeves method [5] and the Steiglitz random-direction method [6]). The algorithm was programmed in expanded BASIC-II; the computation results were satisfactory.

We present two examples.

Example 1. Design of a band-pass filter. The program was run on a Wang MVP computer with k = 4 and N = 12 variables. After 3,886-function calculations, the objective-function value of 0.719 was obtained, entirely in agreement with results reported abroad.

Example 2. Design of a low-pass filter. The program was run on an MVP computer with k = 2 and N = 8, using the starting point given in reference 4. After 296 calculations, a value of 1.03 was obtained; the relative precision of the coefficients was 2^{-7}. This result was satisfactory to the designers.

3. Optimal Design of Longitudinal Section of a Highway

Mathematical description of the longitudinal section of a highway is extremely complex, and accordingly it is rather difficult to use numerical optimization methods. Large computer-based automated-route selection systems have been built abroad. Based on current conditions, we present a simple modeling method suited to solution on a medium-sized computer.

The problem of optimizing the longitudinal section of a highway can be expressed by the formula

$$\min S=\int_{x_0}^{x_n} p(x)\,[y(x)-h(x)]^2 dx, \qquad (3\text{-}1)$$

where y(x) is the design curve for the longitudinal section, h(x) is the terrain cross section and p(x) is a weighting function (see Figure 1). The constraints are (see Figure 2):

(1) Slope constraint: $|y'(x_i)| \leq G_{max}$;

(2) Control points:

(a) Fixed altitudes: $y(\tilde{x}_j) = \tilde{h}_j (j = 1, \cdots, \bar{J})$,

(b) Limiting altitudes: $\tilde{h}_{min,j} \leq y(\tilde{x}_j) \leq \tilde{h}_{max,j} (j = 1, \cdots, \bar{J})$;

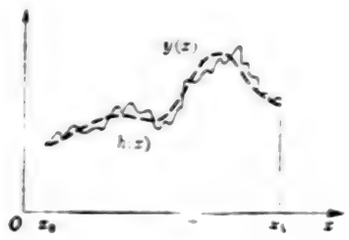


Figure 1

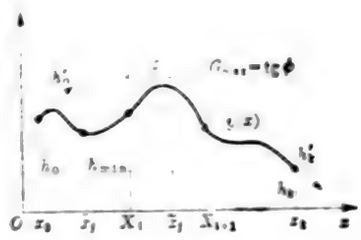


Figure 2

(3) Connection of end points: $y(x_0) = h_0$, $y(x_k) = h_k$,
$y'(x_0) = h'_0$, $y'(x_k) = h'_k$;

(4) Minimun curve length L_{min}. To avoid excessively frequent ups and downs and make the route have a smooth form, we require that the distance between adjoining turning points on the route exceed some constant, i.e.,

$$\min_{0 \leq i \leq \Lambda - 1} |X_{i+1} - X_i| > L_{min}.$$

The key points in the solution of this problem are: (i) selection of some formula as the curve of the longitudinal section; (ii) choice of a method of handling the constraints and performing the optimization computation. Here we replace the usual longitudinal section with B-splines, which not only markedly simplifies the writing expression and utilization of the longitudinal section but also greatly decreases the number of variables to be determined and simplifies the handling of the constraints. In addition, in the solution process we do not directly utilize the ordinary optimization process for the constraints but make full use of the characteristics of the local base supports of B-splines [7] for computer modeling of man-made highway route optimization. This makes it possible to relate the handling of the constraints closely to the real background of the problem, not only resulting in its implementation in a simple and elegant program but also greatly decreasing the iteration time needed.

This treatment is in general use for selecting optimal highway routes. Below we present a specific example. The constraints involved (see Figure 3) are:

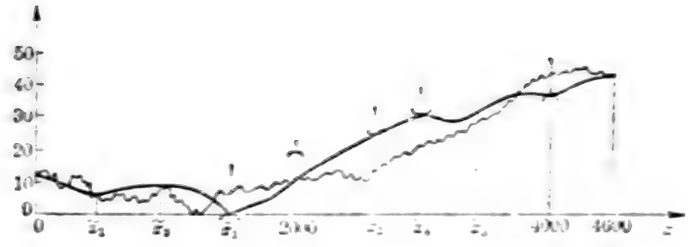


Figure 3

(1) Grade limit: $G_{max} = 0.04$.

(2) Control points:

(a) Fixed elevations: $\tilde{x}_1 = 410$, $\tilde{h}_1 = 6$; $\tilde{x}_2 = 1100$, $\tilde{h}_2 = 5$, $\tilde{x}_3 = 3100$, $\tilde{h}_3 = 40$,

(b) Elevation limits (expressed as $\smile$ and $\frown$ in Figure 3): $\bar{x}_1 = 1500$, $y(\bar{x}_1) \leqslant 0$; $\bar{x}_2 = 2000$, $y(\bar{x}_2) \leqslant 20$; $\bar{x}_3 = 2500$, $y(\bar{x}_3) \geqslant 30$; $\bar{x}_4 = 2800$, $y(\bar{x}_4) \geqslant 30$; $\bar{x}_5 = 4000$, $y(\bar{x}_5) \leqslant 40$.

(3) Connection of end points: $x_{beg} = 0$, $h_{beg} = 12$, $h'_{beg} = -0.04$; $x_{end} = 4600$, $h_{end} = 46.4$, $h'_{end} = 0$.

(4) Minimum curve length: $L_{min} = 200$.

This example was processed on a 709 computer and yielded the optimal result in about half a minute, thus indicating the speed and effectiveness of the method [8]. The computation results are plotted in Figure 3. Under complex conditions, use of the optimal design method to select a new highway route generally decreases engineering costs by 20 percent compared with manual design. Because the unit cost per kilometer of road construction is high, the total cost saving for construction of a road is considerable.

4. Optimal Design of a Gas Turbine Set

The thermal efficiency of a gas turbine unit depends on such factors as the pressure ratio, the temperature ratio, the heat recovery coefficient, the high- and low-pressure compressor ratios and the high- and low-pressure turbine expansion ratios. The task of optimal gas turbine design involves selection of the optimal combination of these characteristics so as to assure optimal thermal efficiency (or maximum specific power). Here we use a thermal efficiency equation for an intermediate-cooling, complex-heat recovery cycle [9]:

$$\eta = \frac{\tau_T(1-\sigma_1^{-m}) - \frac{\tau}{\tau_1}(\sigma_1^m - \sigma_2^{-m} - 1) - \frac{\tau'}{\tau_2}(\sigma_2^m - 1)}{1-(1-\mu)\tau'\left[1+\frac{1}{\tau_3}(\sigma_2^m-1)\right] - \mu\left[1-\tau_T(1-\sigma_1^{-m})\right]}, \qquad (1\text{-}1)$$

where η is the efficiency of the unit, η_T is the turbine efficiency, η_1 and η_2 are the efficiencies of the low-pressure and high-pressure compressors, σ_1 and σ_2 are, respectively, the total pressure ratio of the compressors and the pressure ratio of the high-pressure compressor, μ is the recovery rate, $m = \frac{k-1}{k}$ (k is the thermal insulation coefficient), $\tau = \frac{T_1}{T_3}$, and $\tau' = \frac{T'_1}{T_3}$ (T_1, T'_1 and T_3 are the temperatures at the low-pressure compressor inlet, the high-pressure compressor inlet and the combustion chamber outlet). To maximize the thermal efficiency η, the high-pressure compressor and pressure ratio σ_2 must satisfy the condition

$$\sigma_2^* = \sqrt{\sigma_1} \Big/ \left\{\frac{\eta_2}{\eta_T}[1-(1-\mu)\eta_{max}]\right\}^{\frac{1}{2m}}, \qquad (4\text{-}2)$$

where σ_2^* is the optimal value of σ_2 and η_{max} is the maximum thermal efficiency corresponding to σ_2^*. Based on engineering practice, in equation (4-1) we use $\eta_T = 0.87$, $\eta_1 = \eta_2 = 0.84$, and $m = 0.275$ and let $\tau = \tau'$, and find

$$\max\eta = \eta(\sigma_1, \sigma_2, \mu, \tau),$$

subject to the constraints:

(1) $\sigma_1 \geq \sigma_2$, (3) $\mu \leq 0.75$,
(2) $\sigma_2 \geq 1$, (4) $\tau \geq 0.35$.

Using the SCDD method, we insert the initial values

$$\sigma_1^0 = 4.0,\ \sigma_2^0 = 2.5,\ \mu = 0.78,\ \tau = 0.35,$$

and obtain $\eta^0 = 0.2960$. Making a search on a DJS-6 computer, the follow- figures were obtained [10]:

$$\sigma_1^* = 4.1718,\ \sigma_2^* = 2.3626,\ \mu^* = 0.7497,\ \tau^* = 0.3000,\ \eta_{max} = 0.3484,$$

These results provide valuable data for design of gas turbine units. It is worth pointing out that using this method for optimal selection of thermodynamic characteristics produced the optimal values of all the parameters to be optimized with a relatively small amount of work, avoiding the repetitious computations and laborious drawing of large numbers of graphs of the relationships between the individual factors that had been necessary in the past.

5. Automated Design of Optical Films

The optical characteristics of multilayer optical films are expressed in terms of their reflectivities. The reflectivity is a function of the refractive index of each layer, the film thickness and the wave length λ. The reflectivity of a film of m layers is

$$R[\lambda] = \left| \frac{\eta_0 - Y}{\eta_0 + Y} \right|^2, \quad Y = C \; B,$$

$$\begin{pmatrix} B \\ C \end{pmatrix} = \left\{ \prod_{r=1}^{m} \begin{pmatrix} \cos\delta_r & i\sin\delta_r/\eta_r \\ i\sin\delta_r \cdot \eta_r & \cos\delta_r \end{pmatrix} \right\} \begin{pmatrix} 1 \\ \eta_{m+1} \end{pmatrix},$$

$$\delta_r = \frac{2\pi x_r n_r \cos\theta_r}{\lambda},$$

$$\eta_r = \begin{cases} n_r \cos\theta_r & (s \text{ wave}) \\ n_r / \cos\theta_r & (p \text{ wave}) \end{cases} \quad r = 1, 2, \cdots, m+1,$$

where λ is the wave length of the incident light, m_r are the refractive indices of the layers, n_0 is the refractive index of the medium from which the light is incident, n_{m+1} is the refractive index of the substrate (e.g., glass), θ_0 is the angle of incidence, and θ_r are the refraction angles of the layers from the refraction law

$$n_0 \sin\theta_0 = n_r \sin\theta_r, \quad r = 1, 2, \cdots, m+1$$

and x_r are the geometrical thicknesses of the layers.

The design of a multilayer optical film involves selection of a suitable number of layers and the refractive index and thickness of each layer that will give the required characteristics. Automated design involves the use of a computer to obtain the design characteristics in order to minimize the deviation of the reflectivity $R[\lambda]$ and the desired reflectivity $RD(\lambda)$ in the wavelength interval to be used; this results in the evaluation formula

$$F = \| R - RD \|,$$

where the double vertical lines indicate various models chosen on the basis of actual requirements.

No matter what model is used for evaluation, the structure of function F is extremely complex; it is a nonlinear function of many unknowns, and the customary approach of finding local extrema generally does not give satisfactory results. The main problem is the multiplicity of extrema, making it necessary to use the overall extremum method to obtain the optimal solution [11, 12].

Example 1. Design of a three-layer, low-reflectivity film for the band 400-700 nm with a substrate refractive index of 1.75. The method of search for the overall extremum results in a structure $\lambda/4$-$\lambda/2$-$\lambda/2$, which has not previously appeared in the literature on optical films; the design results are much better than in traditional design research, and the evaluation formula is greatly improved.

Example 2. Design of a six-layer, semitransmitting, laminated coating for a prism with a desired reflectivity $RD[\lambda] = 0.5$ in the visible range. The working angle is 45° and the refractive index of the prism glass is 1.52.

We choose the refractive indices of the layers as $\eta_1 = \eta_3 = \eta_5 = 1.35$ and $\eta_2 = \eta_4 = \eta_6 = 2.35$. The optimization model $F = \max_{\lambda} R[\lambda]-RD[\lambda]$ is used for selection, ultimately giving a maximum deviation of 0.0139 in the visible region, a far better result than previous film design results.

Use of the overall extremum method to design multilayer optical films gives excellent results; details are given in reference 13.

BIBLIOGRAPHY

1. Jiang, Shengjie [1203 5110 7132], "Hecheng An Gongxue" [Synthetic Ammonia Engineering], Chemical Industry Press, 1978.

2. Rosenbrock, H. H., "An Automatic Method for Finding the Greatest or Least Value of a Function," COMPUTER J., No 3, 1960, pp 175-184.

3. Wu, Xijun [0702 6932 7786] et al., "Computer Calculations for a Triple-Tube Synthetic Ammonia Tower," HUAXUE GONGCHENG ZAZHI, No 5, 1977, pp 69-89.

4. Ma, Yongyi [7456 3057 3085], "Computer-Aided Design of an Infinite Impulse Response Digital Filter," SHANGHAI JIAOTONG DAXUE QINGBAO CILIAO, 1980.

5. Hooke, R., and Jeeves, T. A., "Direct Search Solution of Numerical and Statistical Problems," J. ASSOC. COMP. MACH., No 8, 1961, pp 212-221.

6. Steiglitz, "Designing Short-Word Recursive Digital Filters," in "Proc. Ninth Annual Allerton Conf. on Circuits and Systems," 1971, pp 778-788.

7. Risenfeld, R. F., "Applications of B-Spline Approximation to Geometric Problems of Computer-Aided Design," Ph.D. Thesis, Syracuse University, 1972.

8. Yang, Mingsan [2799 2494 0005] et al., "Use of B-Splines for Optimal Design of Highway Longitudinal Sections," SHANGHAI JISUAN JISHU YANJIUSUO ZILIAO, 1980.

9. Kirillov, I. I., "Gasovyye turbiny i gasoturbinyye ustanovki" (Gas Turbines and Gas Turbine Plants), Vol 2, Mashgiz, 1956.

10. Hu, Yuda [5170 3022 6671] et al., "Two Applications of the SCDD Method and Computer Programs for Them," SHANGHAI JIAOTONG DAXUE XUEBAO, No 4, 1979.

11. Zheng Quan [6774 2938] et al., "A Method of Finding the Overall Extremum," YINGYONG SHUZUE XUEBAO, No 2, 1978.

12. Cheng, Quan, "The Problem of Overall Extrema With Time-Adaptive Movement of Variable Domains," GAODENG XUEXIAO JISUAN SHUXUE XUEBAO, No 2, 1979.

13. Zheng, Quan, et al., "Automated Design of Optical Films (II)," ZHEJIANG DAXUE XUEBAO, No 1, 1980.

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LIFE SCIENCES

RETURNED STUDENT MAKES IMPORTANT ACHIEVEMENTS IN RESEARCH ON MICROCIRCULATION

Beijing RENMIN RIBAO in Chinese 4 Dec 83 p 3

[Article by RENMIN RIBAO Reporter: "Xiu Ruijuan Makes Two Major Achievements in Microcirculation--Win Honor for the Motherland, Bring Benefit to Mankind"]

[Text] A female Chinese medical specialist has achieved 2 important fundamental successes in the realm of microcirculation in recent years, and has attracted the attention of international medical circles. She is 47 year-old Dr. Xiu Ruijuan [0208 3843 1227] of the Basic Medicine Research Institute of the Chinese Academy of Medical Sciences.

Dr. Xiu Ruijuan completed a research project on over 20 topics in America at the beginning of September this year and returned to Beijing. The 2 breakthroughs she achieved during the more than 2 years she spent in the U.S. were: 1) She discovered that the Chinese-made medicine Mountain Hyoscyamus niger L. alkali[1] can control the aggregation of blood cells and platelets, and can also control the formation of thrombin. Thisis a topic which has been researched by many people for several years without success. This discovery provides a clinically-effective substance which opens up new prospects for controlling diseases related to thrombosis, one of the greatest dangers to mankind. 2) She discovered and proved for the first time that the self-determined motion in microarterial blood vessels was propagation in the form of a wave, and offered a new thesis on microcirculation in human organs and the organization of replehishment: Wave Replenishment. Authorities on microcirculation in the U.S. and Europe call this new thesis the "Xiu Theory."

These two breakthroughs and other research achievements by Xiu Ruijuan have won widespread international acclaim for Chinese medical circles.

An article on the first breakthrough by Xiu Ruijuan was published in the March 1982 issue of the American Journal of Medicine by invitation from the chief editor, Professor (Gelaosi). After studying the article by Xiu Ruijuan, the American Experimental Biology Association (formed by the American Physiology Association, Biochemistry Association, Pharmacology and Experimental Therapeutics Association, Pathology Association, Nutrition Association and Immunity Association) praised the article as "one of the

few with news value among the more than 7,000 articles received by the association." In addition, the article was included in a special volume of the best articles at a conference of the association and was placed on exhibition at the conference. In February 1983, the winner of the Nobel Prize for Medicine (1982), Prof. Bengt Samuelson entrusted his colleague Dr. Karl (Aerfuer) to invite Dr. Xiu Ruijuan to visit Sweden and discuss cooperative arrangements.

After being read at the 29th meeting of the American Microcirculation Society in Chicago in April 1983, the article by Xiu Ruijuan on her second breakthrough was warmly received. It was announced during the conference that Xiu Ruijuan was a member of the American Microcirculation Society and she was asked to sit at the conference podium. The highly-regarded journal "International Advances in Microcirculation Research" published in New York invited Xiu Ruijuan to become an assistant editor of the journal.

The International Microcirculation Research Institute was established in Sweden in June of this year. Xiu Ruijuan attended the founding conference and was selected as one of the 5 primary leaders of the research institute. The flags of 5 nations were flown in the square at the site of the founding conference, including the flag of the PRC. The chairman of the International Microcirculation Research Institute Dr. (Yingtaigelite) said in a letter of 17 August this year written to the Chinese Academy of Medicine and the Basic Medicine Research Institute, "Her individuality, character and high level of research work have caused her to become one of the people who have attracted attention in several international scientific exchange conferences."

Xiu Ruijuan's breakthroughs in medical research and newest achievements in clinical applications have attracted enormous interest in international medical circles and pharmaceutical companies. Some pharmaceutical companies in the U.S. offered her an annual salary of 60,000 to 80,000 dollars if she would stay and lead experimental work. Representatives of several European and American pharmeceutical manufacturers continually wanted to "cooperate" with her. A representative of one pharmaceutical manufacturer requested a meeting to discuss "cooperative pharmaceutical manufacturing." Some Americans said: "Dr. Xiu, you could rapidly become a millionaire if you decided to stay." Representatives from 6 countries held discussions with Xiu Ruijuan and asked her or her students to go to their country to participate in research work. Xiu Ruijuan answered by saying, "If you want to discuss this, please go to Beijing to discuss it with the relevant departments in the Chinese government." On the way back from the U.S. Xiu Ruijuan stopped in Hong Kong at the Combined Academy of the Chinese University of Hong Kong and discussed her experiences and personal feelings during her more than 2 years abroad under the title, "I Love the Chinese Nation Even More."

After hearing Xiu Ruijuan's report, Minister Cui Yueli [1508 2588 3680] of the Ministry of Public Health said recently, "The important achievements of Xiu Ruijuan in research on microcirculation have caused a sensation

in European and American medical circles, and have brought honor to the Chinese people. The high degree of dedication and patriotic spirit shown by a middle-aged intellectual deserves commendation."

This reporter learned that the state has already allocated 250,000 U.S. dollars for ordering advanced instruments and equipment from abroad to permit faster progress in microcirculation research in China. The Ministry of Public Health recently decided to allocate a large amount of foreign exchange to make it possible for China to have a microcirculation research center with first-class facilities.

Footnote

1. The medicine Mountain Hyoscyamus niger L. alkali is a cooperative achievement in trial manufacture obtained by Fang Qicheng [2455 6386 4453] and 7 other comrades at the Pharmaceutical Research Institute of the Chinese Academy of Medical Sciences, by Wu Zhenggui [0702 2973 6311] of the Qinghai Provincial Medical Sciences Research Institute, by Zhu Shouhe [4376 1108 3109] and 2 other comrades at the Pediatrics Department of the Beijing Friendship Hospital, by Liu Ting [0491 6910] of the Beijing Municipal Otolaryngological Research Institute, Hua Guang [5478 0342], Xiu Ruijuan and a third comrade of the Basic Medicine Research Institute of the Chinese Academy of Medical Sciences, by Xu Huiqin [1776 1979 3830] and another comrade of the Beijing Pharmaceutical Plant and Ren Yongzhi [0117 3057 1807] of the Department of Opthamology at the Naval Hospital. Their work received a Second-Grade Discovery Award from the State Science Commission in 1981.

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MAJOR BREAKTHROUGH MADE IN HEMORRHAGIC FEVER RESEARCH

Beijing GUANGMING RIBAO in Chinese 8 Aug 83 p 2

[Report by Liu Binggi [0491 3521 3823]: "After More than 20 Years of Field Surveys and Laboratory Test, Jiang Kejian and His Assistants Have Made an Important Breakthrough in Studying Hemorrhagic Fever"]

[Text] Jiang Kejian [1203 0344 0313], deputy director of the Shaanxi provincial health and epidemic prevention station, recently led a research group in separating the virus of epidemic hemorrhagic fever from the blood of patients, the black striped female rat and the larvae of trombiculidae, and used domesticated black striped female rats from nonepidemic areas to successfully conduct animal immunization and protection tests. Not long ago, concerned experts participating in the evaluation meeting in Sian unanimously believed this important breakthrough realized by Jiang Kejian and his assistants was a big stride in the research to thoroughly conquer this type of disease in our nation.

The 50-year-old Jiang Kejian graduated from the Wuhan Medical College and has devoted efforts to surveying and researching hemorrhagic fever for more than 20 years. In 1957, he went to the affected areas to launch prevention and control work, and he saw the sad scene of many young men whose life had been taken away by disease. He firmly decided to abandon the comfortable urban life and go to the mountain regions and the rural areas, and he decided to find a way to thoroughly conquer this type of disease.

Finding susceptible animals and cells is the prerequisite in studying the pathogen of hemorrhagic fever. It has also been a difficult problem that has not been solved by efforts of domestic and foreign medical workers since the 1930s. Jiang Kejian began by surveying the topography of medical geology of Shaanxi. During the 20 years, he went to six prefectures and more than 40 counties and cities throughout the province, including the Hanzhong Basin, the Guanzhong Plain and the mountain regions of northern Shaanxi. Hunger during the difficult times did not slow his speed on the bicycle on the banks of the Wei River, armed struggles during the years and months of upheaval did not stop him from going to the Hanzhong Basin to conduct surveys. Even when he faced the danger of being overrun by the floods from the Huashan gorge, he never hesitated and retreated. He spent a full 10 years at the foot of Zongnanshan. He went to the bushes, reed ponds, and fields night

after night and caught 10,000 black striped female rats, and found the medium of transmission of hemorrhagic fever on their bodies--the larvae of the trombiculidae only the size of a pin head. In 1974, Jiang Kejian finally proposed his arguments in the "Black Striped Female Rats of the Nonepidemic Areas of Hanzhong," and opened up a brand new situation in the study of hemorrhagic fever in our nation.

After 1977, Jiang Kejian and his assistants began to domesticate the black striped female rats of the nonepidemic area and conduct infection tests of laboratory animals. These are important links in overcoming the viruses and preventing and controlling hemorrhagic fever. It is also the stage when researchers are most easily infected. In 1979, when the tests were being carried out intensively, six people at the epidemic prevention station and who were involved in a cooperative test at another unit were infected. One comrade of the epidemic prevention station died. Some people became afraid and withdrew from Jiang Kejian's research group. Some people proposed ending the animal infection tests and engaging in general prevention and control work. Jiang Kejian's wife also warned her husband to stop for the sake of safety. Jiang Kejian answered: "There must be somebody to do the dangerous work! If everyone retreats, when can the pain of illness of the people be eliminated?!" He let other comrades perform safe tasks and he himself innoculated and dissected the rats and continued to perform animal infection tests until achievements were made.

After more than 20 springs and autumns, Jiang Kejian and his assistants spent time in the fields and dealt with rats and trombiculidae and viruses. The achievements of their tests reached the international standard and established the foundation for thoroughly conquering epidemic hemorrhagic fever.

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NEED TO DEVELOP RESEARCH ON EUGENICS STRESSED

Genetics Society Meeting

Beijing JIANKANG BAO in Chinese 17 July 1983 p 3

[Article by Su Ziufang [5685 4423 5364]: "Develop our Nation's Eugenics Research By Starting Out From the Actual Situation; the Chinese Genetics Society Held a Special Topics Discussion Meeting. The Meeting Believed Eugenic Protection Laws, the Quality of the Population, Genetic Consultation, Comparison of the Sexes and Intermarriages Are the Most Practical Subjects of Medical Genetics Faced At Present"]

[Text] The discussion meeting on genetic questions in national birth control which ended on 23 June pointed out that eugenics protection laws, the quality of the population, genetic consultation, comparison of the sexes and intermarriages are the subjects of medical genetics that are most practical and that need to be urgently solved in our nation's present birth control work. We must hasten our footsteps, start out from the actual situation, and develop research work in this aspect.

As planned parenthood work continues to deepen, especially since the proposal of one child per couple, the question of the quality of our nation's population has attracted the attention of the party and government at all levels and the attention of all sectors of society. The prevention and control of hereditary diseases is an important aspect of improving the quality of the population. In recent years, many provinces and cities in our nation have conducted surveys of hereditary diseases among newborn babies and population groups. The meeting believed that based on the currently available survey data, the occurrences of hereditary diseases in our nation are serious. The occurrence of abnormality of chromosomes in newborn babies is 0.65 percent, the cases of hereditary diseases caused by a single gene among the population group constitute 2 percent of the total population (if red and blue color blindness is included, it is 5 percent), and the percentage of hereditary diseases caused by multiple genes is as high as 14 percent (not including simple nearsightedness); of these, those born mentally retarded constitute about 0.18 percent (0.58 percent among children), genetic idiocy constitutes 0.14 percent of newborn babies and 0.024 percent of population groups. Hereditary deaf and dumb cases constitute about 0.058 percent, severe nearsightedness and denaturation of

the retina totaling five types of eye diseases constitute about 1.2 percent of the total population. The cases of d and b Mediterranean anemia constitute 0.08 percent of the total population. The occurrence of endemic cretinism disease in high incidence regions is especially serious. Experts attending the meeting emphasized that because our nation is expansive and conditions are complex, we must clearly understand the basic situation of the quality of our nation's population to prevent hereditary diseases. Therefore, epidemiological surveys of the quality of the population must be conducted throughout the nation in an organized way and according to plan.

Delegates generally believed that drawing up "eugenic protection laws" is an important measure to improve the quality of our nation's population. It concerns the personal benefits of the broad masses, therefore it must be done actively and carefully. We must start out from the actual situation. Hereditary diseases that seriously damage health, that lack effective methods of treatment, that are easily grasped by the broad number of medical personnel and that are simply and easily diagnosed should be included in eugenics laws. Tests should be conducted and then gradually popularized. The meeting also emphasized the importance of widespread propaganda of "eugenic" knowledge in the establishment and implementation of eugenics laws.

Hereditary consultation is one of the means to control hereditary diseases. Many provinces and cities have summarized the experience of conducting hereditary consultation in recent years. The Shanghai coordination group of hereditary diseases of multiple genes cooperated with the Shanghai Jiaotong University, utilized computers to develop consultation on hereditary diseases of multiple genes. There already is a good beginning.

Intermarriage is also an important research topic in medical genetics. Available data show that because of the differences in national customs, the percentage of internal marriages at each locality is different, but the death rate among children of intermarriages and the percentage of occurrence of hereditary diseases of multiple genes and recessive genes are both high. The question of comparison between the sexes was a subject of medical genetics that the delegates to the meeting were interested in. Everyone started out from the academic viewpoint and carried out enthusiastic discussion of the relationship between the comparison of the sexes and the control of the population.

This discussion meeting was sponsored by the China Genetics Society.

Research on Hereditary Disease

Beijing JIANKANG BAO in Chinese 17 July 1983 p 3

[Editorial: "Attach Importance to Research on Hereditary Disease"]

[Text] The popularization of eugenic knowledge and the development of scientific research in eugenics favor the improvement of the caliber of our nation's population and constitute an important aspect of planned parenthood work.

Survey data show that the occurrence of hereditary diseases in our nation is still serious. It directly affects the caliber of our nation's population. Developing research in medical genetics in an organized way and according to plan will enable genetics to serve an active function in improving the caliber of our nation's population. We must also see that by developing scientific research in medical genetics, we can quickly develop our nation's science and enable the eugenic work of improving the caliber of the population to develop more rapidly. For example, to prevent and control hereditary diseases well, we must first understand clearly the basic situation of the caliber of our nation's population, actively develop work in monitoring birth defects and the work of carrying out general surveys of the caliber of the population among population groups. These depend on improving the standard of diagnosis and treatment of many types of hereditary diseases and require multidisciplinary cooperation. Also for example, the establishment and implementation of eugenics laws are important measures to prevent and control hereditary diseases, but they must be carried out on the foundation of widely popularizing eugenic knowledge, and there must be research achievements obtained from scientific research in eugenics to serve as the foundation. Therefore, the development of research in medical genetics, whether to realize our nation's task of planned parenthood or to meet the needs in developing science itself, is a glorious and heavy task.

At present, the foundation for research in medical genetics in our nation is relatively weak. There is a great gap between the specialized personnel, the condition of experimental equipment, the standard of research and the need for actual work. We also face many problems that need to be solved urgently. But, as long as we pay attention to this work in thought, are skilled at developing and mobilizing the enthusiasm of the broad number of genetics workers and medical workers, fully support their work, rely on the broad masses, we will definitely create a brand new situation.

9296
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ORGAN TRANSPLANTS ENTER NEW STAGE

Beijing JIANKANG BAO in Chinese 1 Jan 84 p 1

/Article by Liu Keding: "China Ranks with Advanced Nations in Organ Transplants--A Stage in Which Clinical Experience Is Combined with Basic Theory"/

/Text/ Organ transplants in China have reached world standard. So far, 57 cases of liver transplants have been conducted in China, ranking fourth in the world next only to the United States, Great Britain and the FRG. Organ transplant work is a frontier of science in the modern medical field. It started rather late in China: kidney transplants toward the the end of the sixties and liver transplants in the late seventies. Current development is being realized in three areas:

1. Fast clinical development--So far, 1,100 cases of kidney transplants have been completed, including successful transplants done by regional and mining hospitals and country hosptital. The current 1-year survival rates for kidney transplants and patients are 50 percent and 75 percent. The 3-year survival rate is 33.3 percent, which is up to international standard. The surviving period of a kidney transplant case which was conducted in the Zhongshan Hospital affiliated with the Shanghai First Medical College has reached 8 years. Of the 57 liver transplant cases in the nation, 10 were conducted in the Organ Transplant Institute of Wuhan Medical College. The basic pattern of the operation procedure has been established. Some valuable experience in the supply, cleaning and preservation of livers has also been accumulated. In addition, there have been three heart transplant cases in Shanghai and two lung transplant cases in Beijing.

2. The thriving of small organ transplants--There have been 46 cases of various forms of parathyroid gland transplant in the whole nation, among which 20 cases were conducted in Zhongshan Medical College and the transplants included the base of the blood vessels. There were nine bone marrow transplant cases in the nation, of which four were conducted in the Institute of Hematology of Beijing Medical College and have achieved lasting survival status. In the Changhai Hospital, which is affiliated with the Second Military Hospital, one case of acute

lymphocyte leukemia was cured through fetus liver cell transplant. Clinical transplants of pancreas islet and pancreas which barely started coming into clinical use in the world in the eighties have been observed in Shanghai and Nanjing. In Naning and Wuhan, adrenal gland transplants with blood vessel base for treatment of patients with adrenal gland malfunction have achieved good results. Such practices have not yet been reported abroad.

3. Laboratory organ transplant experiments are becoming more advanced. Medical circles in our country have been doing large rat liver transplants and ectopia cardis transplants /heart transplant with positional change/, lung transplant on monkeys, section of pancreas transplant on dogs, liver cell transplant on animal models and animal experiments of immunity transplants etc. Some of these operations are approaching or have already reached advanced world level. The rise of planned forward-looking laboratory research indicates that organ transplants in China have entered a new stage from more clinical experience accumulation, to a new stage of close integration and interaction between clinical experience and theoretical basis.

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BRIEFS

FIRST SUCCESSFUL FETUS LIVER TRANSPLANT--Up to this day, the first leukemia patient who had been treated by fetus liver transplant in our country has lived 202 days. The research result of fetus liver transplant passed appraisal on 21 November 1983 at the Changhai Hospital, which is affiliated with the Second Military Medical College. Fetus liver transplant is a new method adopted in the world in recent years for treating many blood diseases. The method is to use large-dose irradiation to exterminate the cancerous cells which have been invading the patient's bone marrow. Carefully prepared blood-producing cells from fetus liver are then transplanted to the patient to bring the blood-producing function of the patient into full play thus achieving lasting survival and eventual recovery from the disease. /Text/ /Beijing RENMIN RIBAO in Chinese 25 Nov 83 p 1/ 12453

NEW BLOOD TYPE DISCOVERED--A new human white cell blood type, CSH_2, was discovered in the White Cell Typology Laboratory of the Shanghai Central Blood Station. March 1983, Laboratory personnel while conducting a survey on the white cell blood type of the 119 members of 18 families, discovered a new blood type. Investigation of international standard serum further confirmed the discovery. In May, samples of the blood type and concerned documents were mailed to the Immunogenetics Laboratory of the Blood Center in New York and the Blood Service Center of the U.S. Red Cross. The two organizations confirmed that the white cell blood type is one which mainly exists in the yellow race and has heretofore not been discovered in studies based on the white cell blood type study on three hundred people of the white and the black races. /Text/ /Chengdu SICHUAN RIBAO in Chinese 9 Jan 84 p 4/ 12453

MEDICINE RESEARCH WITH JAPAN—The institute of Medicine of China's Academy of Medical Sciences and Japan's Taisho Pharmaceutical Co, Ltd have signed an agreement to jointly develop new medicines. According to the agreement, the two sides will study natural substances, particularly the composition of medicinal herbs. The two sides will seek to find chemical compounds which are efficacious and have no side effects in the treatment of diseases in order to develop new medicines. The two sides reportedly have joint patent rights to data obtained through their research. [Text] [OW120005 Beijing in Japanese to Japan 2130 GMT 10 Mar 84 OW]

GENETIC ENGINEERING BREAKTHROUGH--Shanghai, 8 Mar (XINHUA)--Chinese scientists have separated 40 milligrams of proinsulin protein from one litre of bacterial culture, four times more than the existing international standards, according to the Shanghai Institute of Cell Biology of the Chinese Academy Sciences here today. This is a major breakthrough in China's production insulin--an important protein hormone for the treatment of diabetes--throu genetic engineering, the institute said. The success was made by ass stant research fellow Guo Lihe and three other scientists. Foreign scientists had been trying to separate proinsulin protein from bacterial culture for a long time. So far, they can only get 10 milligrams of such a substance from one litre of bacterial culture. Guo Lihe has also developed two fast-analyzing methods to determine DNA [deoxyribo nuclei acid] molecular structure and the sequences of nucleotides, new techniques in genetic engineering. In August 1980, Guo Lihe went to the United States to do research on insulin production through genetic engineering at Cornell University. Under the guidance of Professor Ray Wu, Guo Lihe achieved a high efficient expression of insulin gene in colon bacillus. Graduated from Shanghai University of Science and Technology in 1964, Guo Lihe, 44, has been conducting research in nucleic acid since 1968. His research contributes to the synthesis of yeast alanine transfer RNA in China in early 1980. [Text] [OW080849 Beijing XINHUA in English 0811 GMT 8 Mar 84]

NEW MALE CONTRACEPTIVE--According to JIAN KANG BAO: a new contraceptive gel injected into the spermatic duct -- J_3 gel, passed technical evaluation in Shaanxi Province on 16 August, and its clinical application will be gradually enlarged. The J_3 gel was successfully developed jointly by the Xian Chemical Research Institute, the Sian Medical College and the Fourth Military Hospital. This is an artificially synthesized high polymer medicine for medical use. It is less irritating, its speed of polymerization is suitable for surgical operation, its side effect is small, and its contraceptive result is good. Since 1980, Shaanxi Province has already used this gel in clinical tests of more than 20,000 people. According to followup observations for 2 years of more than 2,700 cases of people receiving such surgery in Weinan county, the operation left only a smooth node the size of a grain of wheat at the place where the operation was performed using the gel to block the spermatic duct, and it did not cause any damage to the organs of the human body and their function. The success rate of contraception reached 95.78 percent. Tests proved that the J_3 gel did not cause any carcinogenic reaction, did not stimulate cancerous growth, and did not cause deformities and mutations. [Text] [Beijing RENMIN RIBAO in Chinese 23 Aug 83 p 3] 9296

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BIOGRAPHY OF JI WENMEI

Beijing LIXUE YU SHIJIAN [MECHANICS AND PRACTICE] in Chinese No 5, 1983 p 57

[Article by Zhao Junsan [6392 0193 0005]: "Brief Biography of Ji Wenmei [1323 2429 5019], vice president of the Chinese Society of Theoretical and Applied Mechanics"]

[Text] Prof Ji Wenmei was born in 1912 in Yiniao County, Zhejiang Province. After graduating from Shanghai Communications University in 1934 he went to Italy to study and earned his doctorate from the Institute of Aernonautical Engineering at Turin University. He returned to China in 1937 and worked as an engineer at the Nanchang and Nanchuan aircraft manufacturing plants. In 1942 he began work in higher education. He has been professor and chairman of the department of aeronautical engineering at Shanghai Communications University; professor, assistant dean of studies, and assistant dean at the East China Aeronautical Engineering Institute and the Xi'an Aeronautical Engineering Institute, and professor, dean of studies, head of the Basic Theoretical Research Committee, head of the Teaching Work Committee, and vice president of Northwest Industrial University. He is currently president of Northwest Industrial University.

"Mechanics of Materials" and "Applied Mechanics," which Ji Wenmei translated on the eve of liberation and the early post-liberation period, played a big role in raising the level of mechanics in university at that time and were well received in mechanics and science and technology [S&T] circles. He has many times directed translation and authoring work on teaching materials in theoretical mechanics. The teaching materials which he has edited have been chosen as teaching materials and reference books by many schools and have been well received. He has a wealth of teaching experience and for a long time has held positions as member of the All-China Engineering School Mechanics Teaching Materials Editorial and Review Committee and concurrently head of the Theoretical Mechanics Group and deputy chairman and member of the National Defense S&T Commission Aeronautical Engineering Teaching Materials Editorial and Review Committee. In recent years he has also been on the editorial committee of the China Mechanics Library, the subcommittee on the mechanics volune for the encyclopedia, and member of the preparatory committee for the volume of aeronautical and aerospace engineering. In 1983, Ji Wenmei was selected as representative to the Sixth NPC and president of the China Aeronautics Association.

He has actively pursued scientific research in mechanics and vibration, and has published many articles in the JOURNAL OF AERONAUTICS and JOURNAL OF MECHANICS. The vibration polisying machine, which was cooperativley developed by Air Force 5702 Plant and the Northwest Industrial University and was awarded a prize by the China Association of Science and Technology, and the essay "Analysis of the Mechanics of the Vibration Polisher" were largely completed by him. This achievement was hard to come by. It was achieved in 1975, about the time the gang of four was running rampant, when Professor Ji was suffering restrictions. At that time, under conditions in which it was extremely difficult to secure experimental equipment and personnel support, to resolve production problems, he worked very hard and personally carried out experiments over several consecutive months. In 1977 he took on the research topic "Oil Film Extruding Damper as a Mechanism for Reducing Vibration," and is now carrying out this work.

Ji Wenmei has spared no effort with regard to party education and has worked his heart out to train S&T personnel. For a long time he successively undertook the teaching of the basic curriculum in his own field and also was always very concerned about training graduate students. Since 1961, he has trained many of the nation's graduate students, including many who have become mainstay cadres in scientific research work. In early 1982 he also accepted doctoral candidates.

Although he has been very busy with his work he still has high regard and enthusiasm for professional society work. After the China Mechanics Society was established in 1957, with some other comrades he began preparatory work for the Shaanxi Mechanics Society. For a long time he has been president of the Shaanxi Mechanics Society. He is general director of the last session of the China Mechanics Society. At the second session of the expanded board of directors, he was also elected deputy general director of the present session of the China Mechanics Society.

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'SILICON VALLEY' FORECAST IN NORTHERN TAIWAN

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[Text] Taipei, Jan 24 (CNA)--The National Science Council [NSC] under the Executive Yuan said that under government impetus, the Taoyuan-Hsinchu-Miaoli area, with the Hsinchu science-based industrial part at its center, will become the Republic of China's "information terrace" within ten years.

"Information terrace" is a name figuratively alluding to the similar Silicon Valley in California, the United States.

The council pointed out Monday that the terrace area in northern Taiwan now has a population of roughly one million, and with the presence of National Tsing Hua University, National Chiaoutung University, and the Industrial Technology Research Institute, the area now possesses the embryonic form of a high-tech center.

According to government statistics, in the Hsinchu industrial part alone there are now 56 high-tech companies, most of which produce electronics or information products that are exported to 20-odd countries around the world, with a total export value of over U.S. dollars 1 billion last year.

The NCS made the "info terrace"--Silicon Valley comparison based on the following similarities:

-- more than half of the industries developed in Silicon Valley are information-related, and the growth of this industry does not depend very much on natural resources;

-- before its boom 20 years ago, Silicon Valley was without technology based industry, having orchards scattered about. But now its population density and economic prosperity has surpassed even those in New York.

Taiwan's terrace area can grow like that if the same development process centering on the information industry is realized.

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